

# EUROPEAN PATENT OFFICE

## Patent Abstracts of Japan

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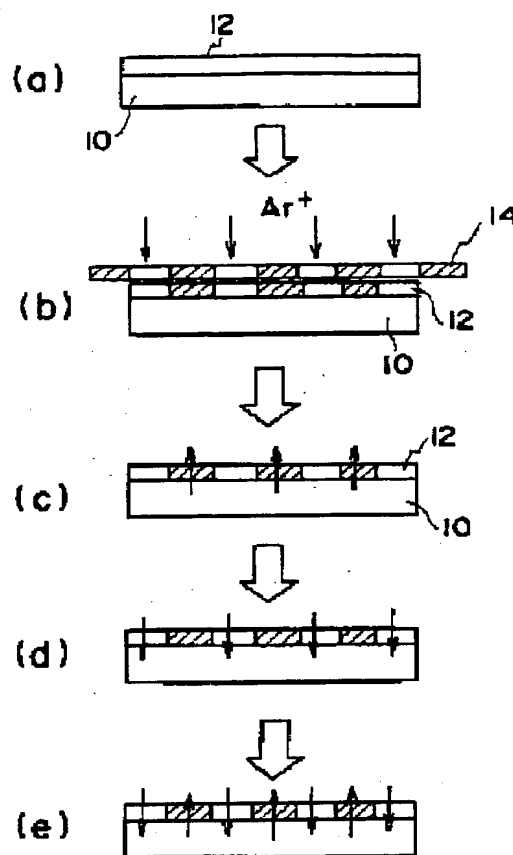
APPLICATION DATE : 27-01-99  
APPLICATION NUMBER : 11018556

APPLICANT : TOYOTA MOTOR CORP;

INVENTOR : NAKAYAMA HIDEKI;

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TITLE : PRODUCTION OF NONLINEAR  
OPTICAL SILICA THIN FILM



**ABSTRACT :** PROBLEM TO BE SOLVED: To provide a process for producing a nonlinear optical silica thin film capable of forming fine polarization inversion structures with a simple stage.

**SOLUTION:** The  $SiO_2$ - $GeO_2$ -base glass thin film 12 formed on a substrate 10 is subjected to irradiation with ion beams of argon ions, etc., only at the specified portions where the glass transition temperature is made lower than that of the non-irradiated portions by cutting between silica networks. Next, the substrate is subjected to alignment processing of dipoles at above the high-temperature side glass transition temperature of the non-irradiated portions and is then subjected to alignment processing of a reverse direction at a temperature above the low-temperature side glass transition temperature of the irradiated portions and below the high-temperature side glass transition temperature. As a result, the polarization inversion structures varying in the alignment directions of dipoles in the irradiated portions and non-irradiated portions with the ion beams may be formed.

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